
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT

In re application of: Kumar et al.

Attorney Docket No.:

ANDIP007/425104

Application No.: 10/045,883

Examiner: Serrao, Ranodhi N.

Filed: January 9, 2002

Group: 2141

Title: METHODS AND APPARATUS
FOR IMPLEMENTING VIRTUALIZATION
OF STORAGE WITHIN A STORAGE AREA
NETWORK THROUGH A VIRTUAL
ENCLOSURE

Confirmation No.: 1172

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PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant requests review of the final rejection in the above-identified application.

This request is being filed with a Notice of Appeal.

The review is requested for the reasons stated on the attached sheets.

Remarks begin on page 2 of this paper.

REMARKS

REJECTION OF CLAIM 21 UNDER 35 USC §102

In the Office Action, the Examiner has rejected claims 1, 3, 4, 7-14, 19, 21, 22, 43, 46, 49, 53, and 55-58 under 35 USC §102(e) as being anticipated by Blumenau et al, U.S. Pat. No. US 6,260,120, ('Blumenau' hereinafter). This rejection is fully traversed below.

The pending claims support the dynamic virtualization of storage in a storage area network. This is accomplished, in part, by sending a message to a port instructing the port to handle messages addressed to a virtual port of a virtual enclosure on behalf of the virtual port, where the virtual enclosure represents one or more virtual storage units.

Claim 1 recites:

A method of implementing storage virtualization in a storage area network, the method comprising:

creating a virtual enclosure, the virtual enclosure being a virtual entity having one or more virtual ports and being adapted for representing one or more virtual storage units, each of the virtual storage units representing one or more physical storage locations on one or more physical storage units of the storage area network;

associating each of the virtual ports of the virtual enclosure with a port of a network device within the storage area network, thereby enabling one or more network devices within the storage area network to be associated with the virtual ports; and

assigning an address or identifier to each of the virtual ports;

wherein associating each of the virtual ports of the virtual enclosure with a port of a network device within the storage area network includes sending a message from a first network device to a port of a second network device within the storage area network to instruct the port of the second network device to handle messages addressed to the address or identifier assigned to the associated virtual port that are received by the port of the second network device subsequent to the message sent by the first network device such that the first network device instructs the port of the second network device to act on behalf of the virtual port.

Similarly, claim 21 recites, in part, "sending a virtualization message to a port of a second network device within the storage area network, the virtualization message instructing the port to handle messages addressed to a virtual port of a virtual enclosure, the virtual

enclosure being a virtual entity having one or more virtual ports and being adapted for representing one or more virtual storage units, each of the virtual storage units representing one or more physical storage locations on one or more physical storage units of the storage area network, wherein the virtualization message indicates that the port is to handle messages addressed to an address or identifier assigned to the virtual port that are received by the port of the second network device subsequent to the virtualization message sent by the first network device such that the first network device instructs the port of the second network device to act on behalf of the virtual port.”

Applicant respectfully asserts that the rejection of the claims as being anticipated by Blumenau is improper. In the previous Office Action, the Examiner admitted that Blumenau fails to teach wherein associating each of the virtual enclosure ports of the virtual enclosure with a port of a network device within the storage area network includes: sending a message from a first network device to a port of a second network device within the storage area network to instruct the port of the second network device to handle messages addressed to the address or identifier assigned to the associated virtual port that are received by the port of the second network device subsequent to the message sent by the first network device such that the first network device instructs the port of the second network device to act on behalf of the virtual port. However, the Examiner now asserts that Blumenau teaches this limitation.

In the current Office Action, the Examiner specifically cites col. 41, line 54- col. 42, line 20 of Blumenau. However, the cited portion fails to disclose or suggest instructing a port to handle messages addressed to an address or identifier assigned to a virtual port, thereby enabling the first network device to instruct the port of the second network device to act on behalf of the virtual port. Rather, the cited portion merely relates to the access of a storage location. Specifically, the host of Blumenau sends a storage access request to a storage subsystem. In order to send an authenticated storage access request, the host controller takes an encrypted value of a random number in a queue for the port adapter, and uses the encrypted value as the Originator_ID in the Frame for the storage access request. This encrypted value does not represent a virtual port of a virtual enclosure. Moreover, the storage access request does not appear to instruct a port as to how it should handle messages that it receives subsequent to the storage access request.

Nothing in the cited portion of Blumenau indicates that the storage access request serves to instruct a port to act on behalf of a virtual port. More specifically, nothing in

Blumenau discloses that a port of a second network device is instructed to handle messages addressed to an address or identifier assigned to an associated virtual port that are received by the port of the second network device subsequent to the message sent by the first network device such that the first network device instructs the port of the second network device to act on behalf of the virtual port.” Accordingly, Applicant respectfully asserts that Blumenau fails to anticipate the pending claims.

The Examiner asserts that the features upon which Applicant relies (i.e., dynamic implementation of virtualization of storage within a storage area network through the use of a virtualization message) are not recited in the rejected claims. Applicant traverses this assertion. For example, claim 1 specifically recites “wherein associating each of the virtual ports of the virtual enclosure with a port of a network device within the storage area network includes sending a message from a first network device to a port of a second network device within the storage area network to instruct the port of the second network device to handle messages addressed to the address or identifier assigned to the associated virtual port that are received by the port of the second network device subsequent to the message sent by the first network device such that the first network device instructs the port of the second network device to act on behalf of the virtual port.” (Emphasis added.) By its very nature, the sending of the message from the first network device to a port of the second network device to instruct it to act on behalf of the virtual port of a virtual enclosure, “the virtual enclosure being a virtual entity having one or more virtual ports and being adapted for representing one or more virtual storage units, each of the virtual storage units representing one or more physical storage locations on one or more physical storage units of the storage area network,” supports the dynamic implementation of virtualization of storage within a storage area network. Applicant does not believe it is necessary to add this additional advantage into the claim language, as the existing claim language is clearly not anticipated by Blumenau.

REJECTION OF CLAIMS UNDER 35 USC §103

In the Office Action, the Examiner has rejected claims 5-6 as being unpatentable over Blumenau in view of Terrell et al, U.S. Pub. No. 2003/0210686, (‘Terrell’ hereinafter). This rejection is fully traversed below.

Terrell fails to cure the deficiencies of Blumenau. The Examiner cites paragraph 158 of Terrell. Paragraph 158 recites “[w]hen a transaction is begun involving one or more

virtual devices (herein called a virtual transaction) routing process 208 identifies a frame that signals the beginning of the virtual transaction, and in response to that frame and in accordance with the protocol identified to the virtual transaction performs the remainder of the virtual transaction in concert with beginning and performing a corresponding transaction with a physical member and/or device (herein called a nonvirtual transaction).” Thus, the routing process initiates nonvirtual transaction(s) corresponding to a virtual transaction. This is accomplished by routing packets to a physical member and/or device for each nonvirtual transaction. However, each physical member/device is not instructed to handle messages addressed to a virtual port or act on behalf of the virtual port. In fact, the physical member/device of Terrell receives a frame addressed to the physical member/device. In other words, the physical member/device is merely performing a transaction by handling a frame addressed to it. The frame is not addressed to a virtual port. The mapping to the physical member/device has already been performed via the routing process.

The Examiner further cites paragraph 237 of Terrell. Paragraph 237 of Terrell indicates that data in storage may be organized in a ring buffer for each output queue. In one implementation, frames are enqueued in accordance with the physical port that received the frame, the physical port identifier to which the frame is destined to be sent, and one or more policy values. Thus, frames addressed to the physical port identifier are enqueued appropriately. The frames do not identify a virtual port. In no manner is the port receiving a frame addressed to it instructed to handle frames addressed to a virtual port. Rather, the port is unaware that the frame was previously addressed to a virtual port. Accordingly, Applicant respectfully submits that Terrell fails to cure the deficiencies of Blumenau.

As recited in the pending claims, a separate network device (e.g., virtual enclosure server) may operate to instruct a port of another network device to act on behalf of a virtual port. Thus, this separate network device sends a message to the port. In accordance with the pending claims, since a virtual port may be “implemented” by a port of any network device within the storage area network, a network’s virtualization capacity may scale with the number of ports in the network. Moreover, sending a message to a port of a network device within the storage area network enables virtualization within a storage area network to be dynamically established.

The cited references, separately or in combination, fail to support the implementation of virtualization among any number of network devices within a storage area network, as

claimed. Moreover, the cited references, separately or in combination, fail to support the dynamic implementation of virtualization of storage within a storage area network through the use of a virtualization message, as claimed. In fact, as set forth in col. 24, lines 25-33 of Blumenau, the “port adapter providing the physical port is programmed to function as an FL_Port, E_Port or F_Port...” However, the instruction of a physical port to function on behalf of a virtual port as set forth in Blumenau is not dynamic. Rather, the physical port is merely programmed to operate in this manner. There is nothing to indicate that such programming refers to the dynamic sending of messages. As such, Blumenau teaches away from the dynamic implementation of virtualization of storage within a storage area network through the use of a virtualization message. Moreover, the combination of the cited references would fail to operate as claimed, and therefore would fail to achieve the desired result. Accordingly, Applicant respectfully submits that the independent claims are patentable over the cited references.

The dependent claims depend from one of the independent claims and are therefore patentable for at least the same reasons. However, the dependent claims recite additional limitations that further distinguish them from the cited references. For example, claim 8 recites that the number of virtual ports to be included in the virtual enclosure is configurable. As another example, claim 14 recites “assigning one or more virtual storage units to the virtual enclosure.”

The additional limitations recited in the independent claims or the dependent claims are not further discussed, as the above discussed limitations are clearly sufficient to distinguish the claimed invention from the cited reference. Thus, it is respectfully requested that the Examiner withdraw the rejection of the claims under 35 USC §103.

Respectfully submitted,
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